

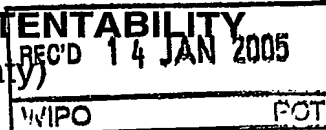
# PATENT COOPERATION TREATY

## PCT

### INTERNATIONAL PRELIMINARY REPORT ON PATENTABILITY

(Chapter II of the Patent Cooperation Treaty)

(PCT Article 36 and Rule 70)



Applicant's or agent's file reference <b>4640N/AEC</b>	<b>FOR FURTHER ACTION</b>  See Form PCT/PEA/416	
International application No. <b>PCT/GB2004/000207</b>	International filing date (day/month/year) <b>21.01.2004</b>	Priority date (day/month/year) <b>30.01.2003</b>
International Patent Classification (IPC) or national classification and IPC <b>H01R4/62, H05B3/84, H01Q1/12, C03C17/36, B23K35/26, B32B17/10</b>		
Applicant <b>PILKINGTON PLC et al.</b>		
<p>1. This report is the international preliminary examination report, established by this International Preliminary Examining Authority under Article 35 and transmitted to the applicant according to Article 36.</p> <p>2. This REPORT consists of a total of 8 sheets, including this cover sheet.</p> <p>3. This report is also accompanied by ANNEXES, comprising:</p> <p style="margin-left: 20px;">a. <input type="checkbox"/> sent to the applicant and to the International Bureau a total of sheets, as follows:</p> <p style="margin-left: 40px;"><input type="checkbox"/> sheets of the description, claims and/or drawings which have been amended and are the basis of this report and/or sheets containing rectifications authorized by this Authority (see Rule 70.16 and Section 607 of the Administrative Instructions).</p> <p style="margin-left: 40px;"><input type="checkbox"/> sheets which supersede earlier sheets, but which this Authority considers contain an amendment that goes beyond the disclosure in the international application as filed, as indicated in item 4 of Box No. I and the Supplemental Box.</p> <p style="margin-left: 20px;">b. <input type="checkbox"/> (sent to the International Bureau only) a total of (indicate type and number of electronic carrier(s)) , containing a sequence listing and/or tables related thereto, in computer readable form only, as indicated in the Supplemental Box Relating to Sequence Listing (see Section 802 of the Administrative Instructions).</p>		
<p>4. This report contains indications relating to the following items:</p> <p><input checked="" type="checkbox"/> Box No. I Basis of the opinion</p> <p><input type="checkbox"/> Box No. II Priority</p> <p><input type="checkbox"/> Box No. III Non-establishment of opinion with regard to novelty, inventive step and industrial applicability</p> <p><input type="checkbox"/> Box No. IV Lack of unity of invention</p> <p><input checked="" type="checkbox"/> Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement</p> <p><input type="checkbox"/> Box No. VI Certain documents cited</p> <p><input type="checkbox"/> Box No. VII Certain defects in the international application</p> <p><input type="checkbox"/> Box No. VIII Certain observations on the international application</p>		
Date of submission of the demand  <b>27.08.2004</b>	Date of completion of this report  <b>13.01.2005</b>	
Name and mailing address of the international preliminary examining authority:  European Patent Office D-80298 Munich Tel. +49 89 2399 - 0 Tx: 523656 epmu d Fax: +49 89 2399 - 4465	Authorized Officer  <b>Lindner, T</b>  Telephone No. +49 89 2399-8976  	

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**Box No. I Basis of the report**

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1. With regard to the **language**, this report is based on the international application in the language in which it was filed, unless otherwise indicated under this item.
- ☐ This report is based on translations from the original language into the following language , which is the language of a translation furnished for the purposes of:
- ☐ international search (under Rules 12.3 and 23.1(b))
  - ☐ publication of the international application (under Rule 12.4)
  - ☐ international preliminary examination (under Rules 55.2 and/or 55.3)
2. With regard to the **elements\*** of the international application, this report is based on *(replacement sheets which have been furnished to the receiving Office in response to an invitation under Article 14 are referred to in this report as "originally filed" and are not annexed to this report):*

**Description, Pages**

1-11 as originally filed

**Claims, Numbers**

1-11 as originally filed

**Drawings, Sheets**

1/1 as originally filed

- ☐ a sequence listing and/or any related table(s) - see Supplemental Box Relating to Sequence Listing

3. ☐ The amendments have resulted in the cancellation of:

- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/figs
- ☐ the sequence listing (*specify*):
- ☐ any table(s) related to sequence listing (*specify*):

4. ☐ This report has been established as if (some of) the amendments annexed to this report and listed below had not been made, since they have been considered to go beyond the disclosure as filed, as indicated in the Supplemental Box (Rule 70.2(c)).

- ☐ the description, pages
- ☐ the claims, Nos.
- ☐ the drawings, sheets/figs
- ☐ the sequence listing (*specify*):
- ☐ any table(s) related to sequence listing (*specify*):

\* If item 4 applies, some or all of these sheets may be marked "superseded."

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**Box No. V Reasoned statement under Article 35(2) with regard to novelty, inventive step or industrial applicability; citations and explanations supporting such statement**

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**1. Statement**

Novelty (N)	Yes: Claims	
	No: Claims	1-3,9,11
Inventive step (IS)	Yes: Claims	
	No: Claims	4-8,10
Industrial applicability (IA)	Yes: Claims	1-11
	No: Claims	

**2. Citations and explanations (Rule 70.7):**

**see separate sheet**

**Re Item V.**

**1. The following documents are referred to:**

- D1 : US 4 057 671 A (SHOOP GEORGE W) 8 November 1977 (1977-11-08)
- D2 : US 3 771 211 A (POSTUPACK DENNIS) 13 November 1973 (1973-11-12)
- D3 : EP 1 199 289 A1 (NIPPON SHEET GLASS) 24 April 2002 (2002-04-24)
- D4 : US 6 086 687 A (BILHAM ROGER ET AL) 11 July 2000 (2000-07-11)
- D5 : EP 0 612 577 A (AT & T CORP) 31 August 1994 (1994-08-31)

**2.1 The international application concerns a glazing panel which comprises first and second electrically conductive components which are joined to one another by means of a lead-free solder which solder comprises a so-called stress modifier. This term points to the intended function of inhibiting the occurrence of stress fault in the pane of glass in the region the solder is applied.**

One preferred embodiment is a silver ink-containing bus bar which is connected to a wiring connector.

Another embodiment is an antenna and its connector.

**2.2 The occurrence of stress causes a variety of defects depending on the nature of the glazing.**

In toughened glass endowed with an obscuration band, the stress fault manifests itself as blisters in the fired-ink band (cf. present claim 6).

In a laminated glass, stress fault leads to cracks in the pane of glass (cf. present claim 7).

Moreover, a further defect might manifest itself in separation between the solder and the first electrically conductive component (cf. present claim 8).

According to claim 1, a stress modifier in the solder inhibits occurrence of these drawbacks.

Glazing panels which display the enumerated defects must have been manufactured with an inappropriate solder and thus do not fall within the scope of claim 1.

For subject-matter outside the scope of the claims, it is not necessary to give an opinion.

- 2.3 Stress fault which leads to the phenomena detailed in the specification and which is caused by the solder might be due to a mismatch of thermal coefficient of expansion which leads to fracture after thermal cycling. Counteracting this defect however cannot be deduced from the specification, as measurement of stress was conducted immediately after the chosen solder had been applied to the surface of a glass pane (p.9, ll.4-9).

Another detrimental effect which has been known in the art is silver migration from an underlying silver-containing ink or frit into a tin-containing solder.

As a result, silver/tin alloys form which are brittle and lead to failure of the connection.

This is reported in lines 30 to 47 at column 1 of D2.

In order to overcome this problem, D2 teaches to dispense with the presence of tin at all and to use a tin-free solder which however comprises lead (col.1, ll.48-65).

- 2.4 The objective problem to be solved thus resides in substituting a lead-containing solder which does not cause stress failure with a solder that meets the same object and furthermore comprises no lead.

#### **Art. 33(2), (3) and (4) PCT**

#### **INDEPENDENT CLAIM 1**

- 3.1 The present application does not meet the criteria of Article 33(1) PCT, because the subject-matter of claims 1 to 3 and 9 is not new in the sense of **Article 33(2) PCT**.

Claim 1 leaves it open as how to assign the role of first and second electrically conductive component to the elements of a glazing.

Document D1 discloses (the references in parenthesis applying to this document) a transparent electroconductive window.

A first element of the assembly is an electroconductive heating element and a second one is a self-soldering bus bar (col.3, ll.20-61).

The solder preferably consists of a blend of fine silver particles and an alloy com-

posed of 52 wt.-% of indium and 48% wt.-% of tin (col.5, ll.36-48 and Example I).

It is the object of the application to provide glazings wherein a lead-free solder connection is not prone to stress failure.

In this context, it is remarked that built-up of stress in a solder connection is related to creeping of the solder.

This problem has been known in the field of vehicular glazings - see D2 already mentioned above.

The problem has been known in the field of double glazed windows - see D3 at page 9, lines 1 to 20 which reports on the reduction of mechanical strength due to alloying of Ag/Cu with tin and concomitantly mentions benefits resulting from the presence of Bi or Sb (increased creep resistance).

The problem has been known in the field of semiconductor devices when mounting silicon chips to printed circuit boards - see D4 in lines 4 to 55.

### 3.2 INDEPENDENT CLAIM 11

The subject-matter of claim 11 is not new in the sense of Article 33(2) PCT.

Document D1 discloses the use of a lead-free solder which includes a mechanical stress modifier for joining two electrically conductive components comprised in a vehicular glazing.

### 3.3 DEPENDENT CLAIMS 2, 3, 5-10

The subject-matter of dependent claims 2 and 3 is already known from D1.

Dependent claim 5 indirectly provides a more concrete hint wherein the problem to be solved lies. The interaction of a tin-containing solder and an silver-containing ink however is already known from D2.

Dependent claims 6 relies upon the presence of a fired-ink band which feature is already present in claim 5.

Claim 6 as such is senseless.

Dependent claim 7 implicitly points out the presence of a laminated structure.

This feature is not unusual for a vehicular glazing and does not contribute to the

solution of the underlying problem.

Claim 8 is trivial in the light of the cited prior art.

Dependent claims 9 and 10 merely concretize the features "first and second conductive element" of claim 1 without adding any feature which, in combination with the features of any claim to which they refer, would aid in resolving the underlying problem (**Article 33(3) PCT**).

### 3.4 DEPENDENT CLAIM 4

Dependent claim 4 includes as a feature a mathematical relationship between the creep rate of the lead-free solder and the decay of the stress generated in the glass pane.

Detailed prescriptions as to how to determine the creep rate and to evaluate measured data are absent from the specification.

In general, a high creep rate is envisaged which is said to accelerate relaxation of the glass pane. Claim 4 requires a value of less than -0.130.

According to D5, creep is one possible reason for joint failures of a solder - see column 1, lines 9 to 16.

D5 reports on creep resistance tests conducted with Bi/Sn alloys - see Example 4 at column 8 and Figure 8.

The composition of this alloy, which is presented as one possible substitute for a lead-containing solder - see the paragraph bridging columns 1 and 2 of D5 -, is the same as that one employed in Example 1 of D1 and is virtually the same as the composition of the alloy used in the first Example of the international application.

It is concluded that the prior art not only provided a variety of lead-free solder compositions, but already gave a clue as to how to select compositions which would excel in stress crack resistance.

The concrete examples of the present application merely confirm what could be expected from related pieces of prior art.

The set of claims as a whole therefore lacks an inventive step.

4. The set of claims is related to the technical area of vehicular glazings and finds

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industrial application in their manufacture.